30'

45'

83°00' 28°15' -

28°00'

45'

30

15'

27°00'

45'

30'

HIGHLAND

GLADES

HENDRY

45'

82°00'

43

CHARLOTTE

47 LEE

15'

81°15'



INTRODUCTION

The intermediate aquifer system within the Southwest Florida Water Management District underlies a 5,000-square-mile area including De Sato, Sarasota, Hardee, Manatee, and parts of Charlotte, Hillsborough, Highlands, and Polk Caunties. It is overlain by the surficial aquifer system and is underlain by the Floridan aquifer system. The intermediate aquifer system consists of layers of sand, shell, clay, calcareous clays, limestone, and dolomite of the Tamiami Formation and Hawthorn Group of late Tertiary age. The aquifer system contains one or more water-bearing units. This aquifer system is the principal source of potable water in the southwestern part of the study area and commonly is used as a source of water in other areas where wells are open to the intermediate aquifer system or to both the intermediate and Floridan aquifer systems. Yields of individual wells open to the intermediate aquifer system range from a few gallans to several hundred gallons per minute. The volume of water withdrawn from the intermediate aquifer system is considerably less than that withdrawn from the Floridan aquifer system in the study area.

In areas where multiple aquifers exist within the system, water levels in wells open to all aquifers were used to prepared the composite potentiometricsurface map shown in this report. The water levels along the northern boundary of the intermediate aquifer system generally are similar to water levels in the underlying Flaridan aquifer system because the confining unit that separates the two aquifers is either absent or discontinuous in that area, permitting direct hydraulic connection between the two aquifer systems.

In the southwestern and lower coastal region of the study area, two aquifers, the Tamiami-upper Hawthorn aquifer and the underlying lower Hawthorn-upper Tampa aquifer, and an intervening confining unit are present in the intermediate aquifer system (Wolansky, 1983). Lateral boundaries for the Tamlami-upper Hawthorn aquifer are undetermined because of limited hydrogeologic data available from wells. The potentiometric surface of the Tamiami-upper Hawthorn aquifer, where it is known to exist, also is shown in

The purpose of this report is to depict the potentiometric surfaces of the composite intermediate aquifer system and the Tamiami-upper Hawtharn aguifer within the aguifer system in September 1992. The potentiometric surfaces in these aquifers represent the level to which water would have risen in tightly cased wells that tap these confined aquifers. The surface was mapped by determining the altitude of water levels in a network of wells and is represented on maps by contours that connect points of equal altitude. This maps show water-level conditions near the end of the summer rainy season (June-September) when ground-woter withdrawals are usually low and the potentiametric surface is near its highest level for the year. The cumulative rainfall for the study area was 5.42 inches below normal for the 12-month period from October 1991 through September 1992 (Sauthwest Florida Water Management District, 1992).

This report, prepared by the U.S. Geological Survey, in cooperation with the Southwest Florida Water Management District, is one of a series of intermediate aquifer system potentiometric-surface map reports made for the study area since September 1985 based on synoptic water-level measurements. Water-level data are collected in May and September to depict the annual low and high water-level conditions, respectively. Most of the water-level data for this map were collected by the U.S. Geological Survey during the period of September 14–18, 1992. Supplemental data were collected by other agencies and companies.

SUMMARY OF HYDROGEOLOGIC CONDITIONS

The composite potentiometric surface of all water-bearing units within the intermediate aquifer system is shown in figure 1. The potentiometric surface of the Tamiami-upper Hawthorn aquifer is shown in figure 2 and is bosed on water levels in wells open exclusively to this aquifer. The hydrographs for selected wells, shown in figure 3, indicate that the annual and seasonal fluctuations of the water levels are generally large (about 7 to 15 feet) in the central interior region where water demand for irrigation is high during fall and spring (hydrographs 2, 4, 5, and 9). Water-level fluctuations generally are smaller (about 3 to 5 feet) in the northern part of the study area (hydrographs 1 and 3) and in coastal areas (hydrographs 7 and 8) where water use is predominantly for public supply. Hydrographs in figure 4 depict the maximum daily water-level altitudes in selected wells from September 1991 to September 1992.

Water levels measured in September 1992 for the composite intermediate aquifer potentiometric surface were higher than those measured in May 1992 (Mularoni, 1992a). In 133 wells with paired measurements, the September 1992 level ranged from 6.99 feet below to 48.96 feet above the May 1992 level and averaged 8.59 feet above the May level. In 29 wells in the Tamiami-upper Hawthorn aquifer with paired measurements, the September 1992 level ranged fram 1.86 feet below to 17.23 feet above the May 1992 level and averaged 4.33

feet above the May level. September 1992 water levels for the composite intermediate aquifer potentiometric surface generally were lower than those reported for September 1991 (Mularoni, 1992b). In 130 wells with paired measurements, the September 1992 level ranged from 16.92 ft below to 17.86 ft above the September 1991 level and averaged 0.37 ft below the September 1991 level. In 30 wells in the Tamiami-upper Hawthorn aquifer with paired measurements, the September 1992 level ranged from 3.68 ft below to 9.63 ft above the September 1991 level and averaged 0.21 ft above the September 1991 level. At Verna well field in northeast Sarasota County a 20-foot contour was estimated from measurements in wells that tap both the Upper Floridan and Intermediate aquifers (fig. 1). A cone of depression in the potentiometric surface of the composite intermediate aquifer system in western Lee County exists at a well field that supplies Pine Island (fig. 1). A cone of depression that extends below sea level exists in the potentiometric surface of the Tamiami-upper Hawthorn aquifer in northern Lee County at a well field that supplies Cape Coral (fig. 2). A cone of depression also exists in potentiometric surfaces for the composite aquifer system and the Tamiami-upper Hawthorn aquifer at Worm Mineral Springs, which is a natural discharge point from the intermediate aquifer system (figs. 1 and

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271757081493003 ROMP 26 Hawthorn Well near Gardner

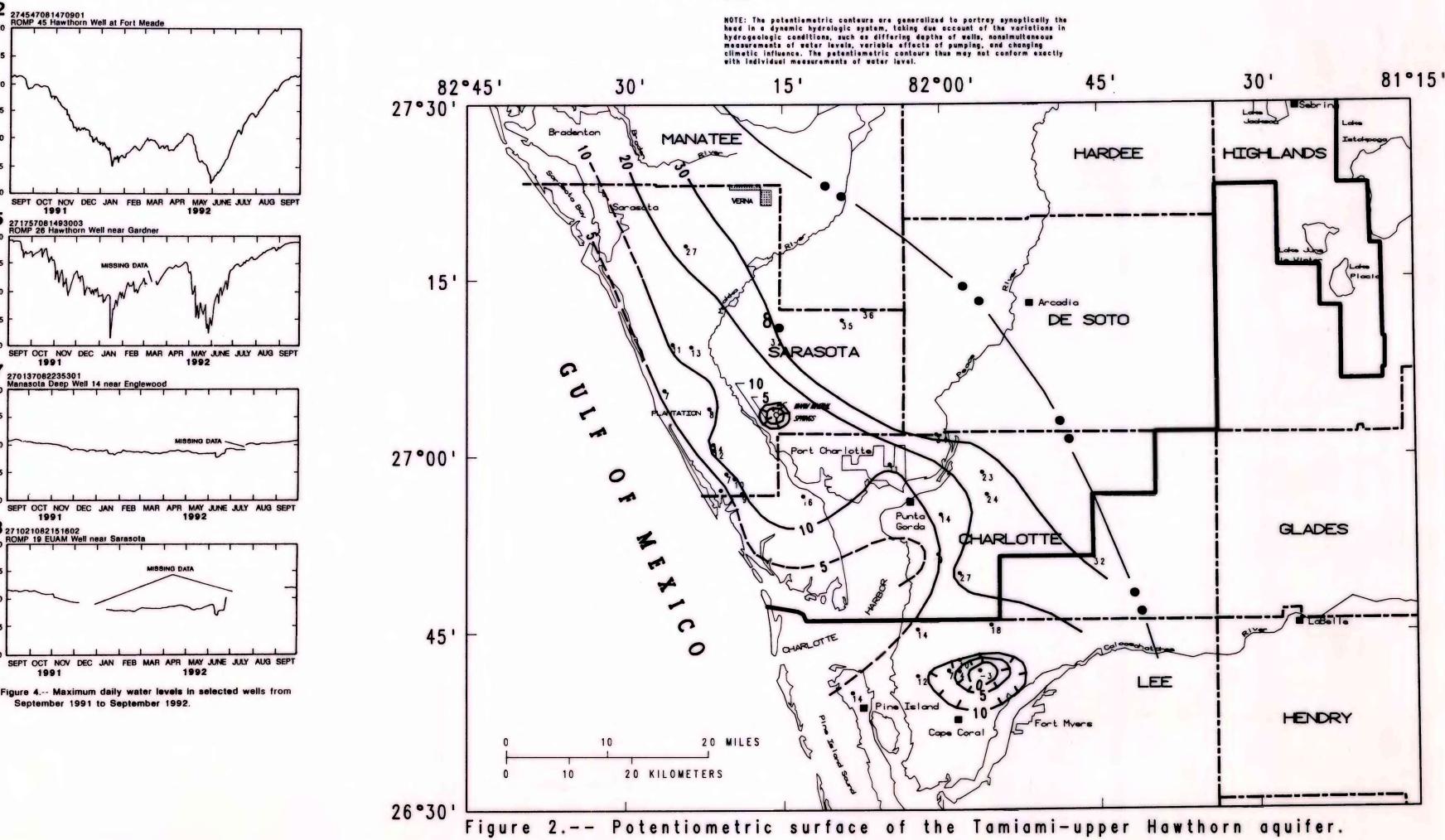
270137082235301 Manasota Deep Well 14 near Englewood

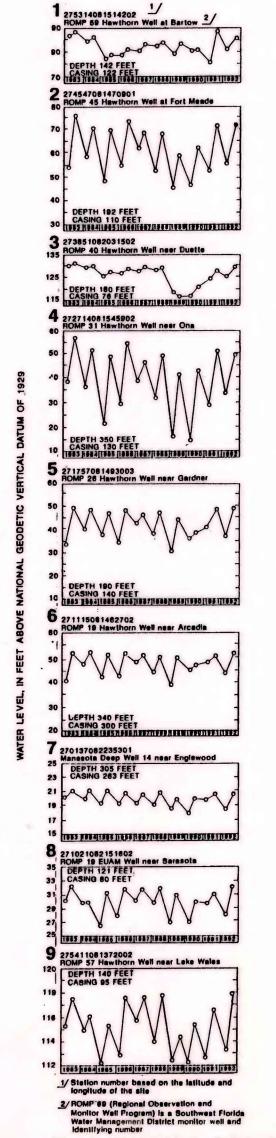
September 1991 to September 1992.

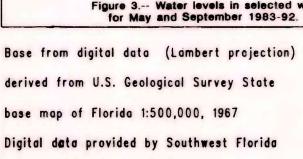
20 KILOMETERS 26°30' Figure 1.-- Composite potentiometric surface of the intermediate aquifer system. EXPLANATION (FIGURES 1 AND 2) MUNICIPAL WELL FIELD POTENTIOMETRIC CONTOUR — — Shows altitude at which water level would have stood in tightly cased wells. Contour interval 5 and 10 feet. National Geodetic Vertical Datum of 1929. Hachures indicate depressions. Dashed where BOUNDARY OF WATER MANAGEMENT DISTRICT BASIN APPROXIMATE NORTHERN BOUNDARY OF THE INTERMEDIATE AQUIFER SYSTEM (fig. 1) APPROXIMATE NORTHERN BOUNDARY OF THE TAMIAMI-UPPER HAWTHORN AQUIFER (fig. 2) OBSERVATION WELL — Large number identifies hydrograph (figs. 1 and 2). Small number is altitude of water level in feet above or below NGVD of 1929.

0

20 MILES







Water Management District

POTENTIOMETRIC SURFACES OF THE INTERMEDIATE AQUIFER SYSTEM, WEST-CENTRAL FLORIDA, SEPTEMBER 1992

Copies of this map can be purchased from: U.S. Geological Survey Book and Open-File Reports Section Federal Center Box 25425 Denver, Colorado 80225